

Patent Claims

1. Nucleic acids encoding plant phosphomevalonate kinases, with the exception of the nucleic acid fragments in accordance with SEQ ID NO: 3, 4 and 5.

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2. Nucleic acids according to Claim 1, characterized in that they encode *A. thaliana* phosphomevalonate kinases.

3. Nucleic acids according to Claim 1 or 2, characterized in that they are single-stranded or double-stranded DNA or RNA.

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4. Nucleic acids according to Claim 3, characterized in that they are fragments of genomic DNA or cDNA.

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5. Nucleic acids according to one of Claims 1 to 4, characterized in that they are derived from *A. thaliana*.

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6. Nucleic acids according to one of Claims 1 to 5, encompassing a sequence selected from amongst

(a) the sequence in accordance with SEQ ID NO: 1,

(b) sequences which encode a polypeptide which encompasses the amino acid sequence in accordance with SEQ ID NO: 2,

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(c) part sequences of the sequences defined under (a) or (b) which have a length of at least 14 base pairs,

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(d) sequences which hybridize with the sequences defined under (a) or (b) at a hybridization temperature of 35-52°C,

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- (e) sequences which have at least 70% identity with the sequences defined under (a) or (b),
- (f) sequences which are complementary to the sequences defined under a) or b), and
- (g) sequences which, owing to the degeneracy of the genetic code, encode the same amino acid sequence as the sequences defined under a) to e).

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- 7. DNA construct encompassing a nucleic acid according to one of Claims 1 to 6 and a heterologous promoter.
- 8. Vector encompassing a nucleic acid according to one of Claims 1 to 6 or a DNA construct according to Claim 7.

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- 9. Vector according to Claim 8, characterized in that the nucleic acid is linked functionally to regulatory sequences which ensure expression of the nucleic acid in pro- or eukaryotic cells.

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- 10. Host cell comprising a nucleic acid according to one of Claims 1 to 6, a DNA construct according to Claim 7 or a vector according to Claim 8 or 9.
- 11. Host cell according to Claim 10, characterized in that it is a prokaryotic cell.

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- 12. Host cell according to Claim 11, characterized in that it is a eukaryotic cell.
- 13. Polypeptide with the biological activity of a phosphomevalonate kinase which is encoded by a nucleic acid according to one of Claims 1 to 6.

14. Polypeptide with the biological activity of a phosphomevalonate kinase which encompasses an amino acid sequence with at least 70% identity with the sequence in accordance with SEQ ID NO: 2.

5 15. Antibody which binds specifically to a polypeptide according to Claim 13 or 14.

10 16. Method of generating a nucleic acid according to one of Claims 1 to 6, encompassing the following steps:

15 (a) complete chemical synthesis in a manner known per se or

15 (b) chemical synthesis of oligonucleotides, labelling of the oligonucleotides, hybridizing of the oligonucleotides with DNA of a genomic or cDNA library which had been generated starting from genomic DNA or mRNA from plant cells, selecting positive clones, and isolating the hybridizing DNA from positive clones, or

20 (c) chemical synthesis of oligonucleotides and amplification of the target DNA by means of PCR.

25 17. Method of generating a polypeptide according to Claim 13, encompassing

25 (a) culturing a host cell according to one of Claims 10 to 12 under conditions which ensure expression of the nucleic acid according to one of Claims 1 to 6, or

30 (b) expressing a nucleic acid according to one of Claims 1 to 6 in an *in-vitro* system, and

(c) obtaining the polypeptide from the cell, the culture medium or the *in-vitro* system.

18. Method of finding a chemical compound which binds to a polypeptide
5 according to Claim 13 or 14 and/or modulates the activity of this polypeptide,
encompassing the following steps:

10 (a) contacting a host cell according to one of Claims 10 to 12 or a polypeptide according to Claim 13 or 14 with a chemical compound or a mixture of chemical compounds under conditions which permit the interaction of a chemical compound with the polypeptide, and
15 (b) determining the chemical compound which binds specifically to the polypeptide.

19. Method of finding a compound which modifies the expression of polypeptides according to Claim 13, encompassing the following steps:

20 (a) contacting a host cell according to one of Claims 10 to 12 with a chemical compound or a mixture of chemical compounds,
25 (b) determining the polypeptide concentration, and
(c) determining the compound which specifically affects the expression of the polypeptide.

20. Use of plant phosphomevalonate kinases, of nucleic acids encoding them, DNA constructs or host cells comprising these nucleic acids for finding new herbicidal active compounds.

21. Use of plant phosphomevalonate kinases, of nucleic acids encoding them, DNA constructs or host cells in methods according to Claim 18 or 19.
22. Use of a modulator of a polypeptide with the biological activity of a phosphomevalonate kinase as plant growth regulator or herbicide.
23. Modulators which are identified by a method according to Claim 18 or 19.
24. Herbicidally active substances which are found by means of a method according to Claim 18 or 19.

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